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| APPLICATION NO.  | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|--|-------------|----------------------|---------------------|------------------|
| 10/697,311   | 10/31/2003  | Yoshinori Shizuno    | OHG 143             | 9864             |
| 23995  | 7590        | 11/16/2005           | EXAMINER            |                  |
| RABIN & Berdo, PC<br>1101 14TH STREET, NW<br>SUITE 500<br>WASHINGTON, DC 20005 |             |                      | LEE, EUGENE         |                  |
|  |             |                      | ART UNIT            | PAPER NUMBER     |
|  |             |                      | 2815                |                  |

DATE MAILED: 11/16/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

|                              |                               |                                    |  |
|------------------------------|-------------------------------|------------------------------------|--|
| <b>Office Action Summary</b> | Application No.<br>10/697,311 | Applicant(s)<br>SHIZUNO, YOSHINORI |  |
|                              | Examiner<br>Eugene Lee        | Art Unit<br>2815                   |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 20 September 2005.
- 2a) ☐ This action is FINAL.      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) 10-20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 31 October 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>01/05, 11/04 &amp; 10/03</u> | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Election/Restrictions***

1. Applicant's election with traverse of Species I (claims 1-9) in the reply filed on 9/20/05 is acknowledged. The traversal is on the ground(s) that claim 10 basically adds one feature to the subject matter of claims and therefore is narrower than claim 1. This is not found persuasive because Species I, and Species II are directed towards two distinct species of the claimed invention as disclosed in the specification. Therefore, the requirement is still deemed proper and is therefore made FINAL.

Claims 10 thru 20 are withdrawn from further consideration pursuant to 37 CFR

1.142(b), as being drawn to a nonelected invention, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in the reply filed on 9/20/05.

### ***Drawings***

2. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, (1) a plurality of wiring patterns ... extended from said electrode pads to the surface of said extension portion (claim 1); (2) the thin oxidation layer (claim 4); and (3) portion of said wiring patterns on a boundary and vicinity of a boundary between said semiconductor chip and said extension portion is formed more thickly than other portions of said wiring patterns (claim 7) must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as “amended.” If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

3. The drawings are objected to because in FIG. 2, it appears element 20 is referring to the same structure as element 20a because the line from element 20 adjoins the line from element 20a. However, it appears from the specification that element 20a is referring to the first surface, and element 20 is referring to the extension portion; two distinct structures in the figure.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be

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labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

***Claim Rejections - 35 USC § 112***

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claim 4 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. It is unclear how a thin oxidation layer can be formed on the surface of electrode posts and still have an electrical connection between the external terminals and the electrode posts. The oxidation layer is insulative and prevents any electrical connection between the two areas.

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6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 1 thru 9 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In lines 14-17 of claim 1, it is unclear how the “plurality of wiring patterns ... extended from said electrode pads to the surface of said extension portion”. From FIG. 2, for example, the plurality of wiring patterns 42 are above the electrode pads 34, and extension portion 20, but the plurality of wiring patterns do not extend from the electrode pads to the surface of said extension portion. Appropriate clarification and/or correction are required.

In claim 7, it is unclear what the applicant defines as “portion” and how it is differentiated from “other portions” stated later in the claim. Furthermore, it is unclear what the applicant defines as the “boundary” as stated in the claim.

### *Claim Rejections - 35 USC § 102*

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Insofar as definite, claims 1 thru 3, and 5 thru 7 are rejected under 35 U.S.C. 102(b) as being anticipated by Nakamigawa et al. JP 2000208556 A. Nakamigawa discloses (see, for example, figure 3) a semiconductor device comprising a semiconductor chip 1, plurality of chip

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electrodes (plurality of electrode pads) 10, resin (extension portion) 9, adhesives (insulating film) 4, wirings (plurality of wiring patterns) 5, substrate (sealing portion) 2, and plurality of solder balls (plurality of external terminals) 12.

Regarding claims 2, and 3, see, for example, figure 3 wherein Nakamigawa discloses vertical regions (electrode posts) in between the solder ball 12 and the pad 13.

Regarding claims 5, and 6, it has been held that a recitation (i.e. formed as solders balls, lands) with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations. *Ex Parte Masham*, 2 USPQ F. 2d 1647 (1987).

### *Claim Rejections - 35 USC § 103*

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nakamigawa et al. JP 2000208556 A as applied to claims 1-3, and 5-7 above, and further in view of Tung et al. 5,342,495. Nakamigawa does not disclose a thin oxidation layer. However, Tung discloses (see, for example, FIG. 1F) a semiconductor device comprising a conductive bump 50, and oxidized barrier metal layer (thin oxidation layer) 25. In column 4, lines 55-59, Tung discloses that the barrier metal layer prevents the conductive bump material from diffusing. Therefore, it would

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have been obvious to one of ordinary skill in the art at the time of invention to have a thin oxidation layer in order to prevent the plurality of solder balls from diffusing.

12. Claims 8, and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakamigawa et al. JP 2000208556 A as applied to claims 1-3, and 5-7 above, and further in view of Ma et al. 6,271,469 B1. Nakamigawa does not disclose said extension portion being formed from a material having a greater molding shrinkage than the molding shrinkage of said sealing portion. However, Ma discloses (see, for example, FIG. 1K) a package comprising an encapsulating material (extension portion) 112, and first dielectric layer (sealing portion) 118. In column 3, lines 54-63, and column 4, lines 6-12, Ma discloses the encapsulating material comprising plastics, resins, and the first dielectric layer comprising silicon dioxide, silicon nitride. Plastics, resins have a greater molding shrinkage than silicon oxide, silicon nitride. Ma further discloses the encapsulation provides mechanical rigidity, protects the die from contaminants, and provides surface area for the build-up of trace layers. The first dielectric layer provides an adequate material so that vias may be formed thereon. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to have said extension portion being formed from a material having a greater molding shrinkage than the molding shrinkage of said sealing portion in order to have an extension portion that has mechanical rigidity, protects the die from contaminants, and provides surface area for the build-up of trace layers, and a sealing portion made of a material that can support the wirings.

Regarding claim 9, Nakamigawa in view of Ma does not disclose said extension



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portion having a linear expansion coefficient in a lower temperature range than glass transition temperature of less than  $1.5 \times 10^{-5}/^{\circ}\text{C}$ . and a modulus of elasticity within a range of 7.8 to 22 GPa. However, it would have been obvious to one of ordinary skill in the art at the time of invention was made to use a material having a linear expansion coefficient in a lower temperature range than glass transition temperature of less than  $1.5 \times 10^{-5}/^{\circ}\text{C}$ . and a modulus of elasticity within a range of 7.8 to 22 GPa in order to have a material that has adequate mechanical rigidity, provides protection for the semiconductor chip, and provides surface area for the build-up of trace layers.

#### **INFORMATION ON HOW TO CONTACT THE USPTO**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eugene Lee whose telephone number is 571-272-1733. The examiner can normally be reached on M-F 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on 571-272-1664. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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Eugene Lee  
November 9, 2005

A handwritten signature in black ink, appearing to read 'Eugene Lee', with a large loop at the end of the last name.